

CLAIMS

1. A magnetic core material comprising a composite material of a soft magnetic metal powder and plastic or rubber,

wherein the soft magnetic metal powder is concatenated by spontaneous magnetization to form a plurality of aggregates, and

the longitudinal direction of each aggregate faces a substantially fixed direction.

2. A magnetic core material comprising a composite material of a soft magnetic metal powder having a diameter of about 1 μm or less and plastic or rubber,

wherein the soft magnetic metal powder is concatenated by spontaneous magnetization to form a plurality of aggregates, and

the longitudinal direction of each aggregate faces a substantially fixed direction.

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3. The magnetic core material according to Claim 1,
wherein the volume ratio of the content of the soft magnetic metal powder is in a range of 10% to 50%.

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4. The magnetic core material according to Claim 1,

wherein the volume ratio of the content of the soft magnetic metal powder is in a range of 10% to 40%.

5. The magnetic core material according to Claim 1,
wherein the soft magnetic metal powder includes any one
of a nickel powder, a cobalt powder, and an iron powder
which are obtained by reducing an oxide.

10 6. The magnetic core material according to Claim 1,
wherein the soft magnetic metal powder includes any one
of a nickel powder, a cobalt powder, and an iron powder by
using a gas phase method.

15 7. The magnetic core material according to Claim 1,
wherein the soft magnetic metal powder includes any one
of a nickel powder, a cobalt powder, and an iron powder
which are obtained by reducing a solution containing
metallic ions.

20 8. The magnetic core material according to Claim 1,
wherein the soft magnetic metal powder includes a
carbonyl nickel powder or a carbonyl iron powder.

25 9. An antenna in which a spiral conductor pattern is
formed on one surface of the magnetic core material worked

in the form of a plate according to Claim 1.

10. An antenna in which a spiral conductor pattern is formed on one surface of the magnetic core material worked
5 in the form of a plate according to Claim 1, and a conductive material is disposed on the other surface of the magnetic core material.

11. The antenna according to Claim 9,
10 wherein the plate-like magnetic core material consists of a plurality of magnetic core material pieces in which the longitudinal directions of the aggregates of the soft magnetic metal powder are different from each other.

15 12. The antenna according to Claim 9,
wherein the conductor pattern is formed in a rectangular shape, and the plate-like magnetic core material is disposed so as to be overlapped with only one side or two opposite sides of the rectangular conductor pattern, as
20 viewed from a direction orthogonal to a surface of the plate-like magnetic core material.

13. An antenna in which a leading wire is wound around the magnetic core material worked in the form of a plate
25 according to Claim 1 such that the magnetic axis of the

magnetic core material may substantially coincide with the longitudinal directions of the aggregates of the soft magnetic metal powder.

5 14. The antenna according to Claim 9,
wherein the antenna is used for an RFID tag or an RFID reader/writer which uses at least a VHF band or a UHF band as a communication frequency.

10 15. A method of manufacturing a magnetic core material using a composite material of a soft magnetic metal powder and plastic, the method comprising the steps of:

heating and kneading the soft magnetic metal powder and the plastic; and

15 working the kneaded composite by using any one method of extruding, rolling, rolling after extruding, drawing after extruding, and rolling after injection so that the longitudinal directions of a plurality of aggregates formed by concatenating the soft magnetic metal powder by
20 spontaneous magnetization may face a substantially fixed direction.

16. A method of manufacturing a magnetic core material using a composite material of a soft magnetic metal powder
25 and plastic, the method comprising the step of:

applying a direct-current magnetic field after a film
is coated with ink in which the soft magnetic metal powder
is suspended in a solvent which has dissolved the plastic
and before the coated film is dried so that the longitudinal
5 directions of a plurality of aggregates formed by
concatenating the soft magnetic metal powder by spontaneous
magnetization may be aligned in a substantially fixed
direction.